NOTES AND NEWS

OBSERVATIONS OF HAUSTORIA AND HOST PREFERENCE IN *Cordylanthus maritimus* SUBSP. *maritimus* (SCROPHULARIACEAE) AT MUGU LAGOON.—The genus *Cordylanthus* (tribe Euphrasieae) includes some 35 species indigenous to western North America. One species in this genus, *Cordylanthus maritimus,* has been divided into three subspecies on the basis of geographical and, to a lesser extent, morphological characteristics. The subspecies of haustorial study in this note and the southernmost in distribution is *Cordylanthus maritimus* subsp. *maritimus,* salt marsh bird's beak. At one time this plant was a common component of coastal salt marshes in California but is currently found in only five locations from Santa Barbara County southward to Baja. This subspecies can be found April through October in dense, nearly monotypic stands within the salt marsh vegetation in the western arm of Mugu Lagoon (Ventura County, California).

The ability of plants within the genus *Cordylanthus* to continue to grow and flower during hot, dry summer months warranted scientific speculation as to the parasitic potential of the genus. Piehl first verified parasitism in *Cordylanthus* in 1966 and Chuang and Heckard found haustorial connections between *Cordylanthus maritimus* and *Helianthus annuus* in 1971. No previous haustorial work has been done with *Cordylanthus maritimus* subsp. *maritimus.* It was therefore postulated that this subspecies might also produce haustoria to draw water and/or nutrients from surrounding marsh plants through root associations. Although these connections were shown to be non-essential for *Cordylanthus* species in greenhouse culture (Chuang and Heckard, Amer. J. Bot. 58:218–228. 1971), natural environmental conditions found in salt marshes, such as low soil nutrient availability and soil moisture stress (either through elevated soil salinities or high moisture tension), could possibly "justify" the need for these haustorial connections.

At Mugu Lagoon, salt marsh bird's beak can be found growing with a variety of plant species. Commonly associated species include: *Salicornia virginica, Jaumea carnosa, Frankenia grandifolia, Limonium californica, Cressa truxillensis,* and *Distichlis spicata.* Host preference between *Cordylanthus maritimus* and *Distichlis spicata* has been suggested by Chuang and Heckard (1971) and at Mugu Lagoon, *Distichlis spicata* is the only species always associated with salt marsh bird's beak. Less common associates include: *Lasthenia chrysostoma, Monanthochloe littoralis, Cuscuta salina, Scirpus robustus, Juncus acutus, Typha latifolia, Atriplex patula hastata, Triglochin concinnum* and *Polypogon monspeliensis.*

Hosts were investigated in both the laboratory and field to determine the extent of host species specificity in salt marsh bird's beak. For the laboratory studies, host plants were collected in the field for establishment in clay pots. Salt marsh bird's beak seeds (collected the previous year at Mugu Lagoon) were planted with these hosts once they were growing successfully. The salt marsh bird's beak seedlings were thinned to three per host pot upon germination. The hosts and salt marsh bird's beak were grown together until the senescence of the salt marsh bird's beak. The soils and plants were then carefully examined for haustorial connections. In field studies, potential host plants and adjacent salt marsh bird's beak were removed with their root zones intact and the soils and plants examined for haustorial connections. Salt marsh bird's beak was also grown by itself in pots to determine whether or not the subspecies is an obligate or facultative parasite.

Salt marsh bird's beak was found to be a facultative parasite, capable of growing with or without haustorial connections to other plant species. In the laboratory studies, small lateral haustorial connections were verified between salt marsh bird's beak and *Distichlis spicata, Polypogon monspeliensis, Salicornia virginica, Jaumea carnosa* and *Helianthus annuus.* Field connections were verified with *Distichlis spicata, Frankenia grandifolia, Scirpus robustus* and *Typha latifolia.* Salt marsh bird's beak also formed haustoria with members of its own subspecies in the lab and field indicating that it

is capable of intraspecific as well as interspecific parasitism. No haustorial connections were found with *Frankenia grandifolia* in the lab or with *Triglochin concinnum, Monanthochloe littoralis* or *Cressa truxillensis* in the field despite association with all four species in the field. The fact that *Helianthus annuus* was also an effective host indicates a lack of host specificity. The possibility exists therefore that salt marsh bird's beak distribution is a function of a strong habitat preference rather than a host preference in *Cordylanthus maritimus* subsp. *maritimus* as is indicated with *Cordylanthus maritimus* (Chuang and Heckard 1971).

There was no observable increase in vigor in the laboratory specimens associated with hosts and therefore the type of benefit to salt marsh bird's beak from these hosts is still uncertain. Chlorophyll is present in salt marsh bird's beak as is often the case in parasites that utilize many small, lateral (often ephemeral) haustoria. These parasites require a certain degree of photosynthetic efficiency to carry them through early development and search for hosts. The presence of chlorophyll may also help to bridge periods without hosts (Kuijt, *The Biology of Parasitic Flowering Plants,* Univ. California Press, 1969).

Parasitism undoubtedly permits salt marsh bird's beak to flourish in the hot, dry conditions of summer when most other annuals have completed their life cycles. This mechanism has likely been of considerable importance in successfully equipping *Cordylanthus maritimus* subsp. *maritimus* for survival in western North America.—JULIE M. VANDERWIER and JUDITH C. NEWMAN, Natural Resources Management Office, Pacific Missile Test Center, Point Mugu, CA 93042. (Received 28 Oct 1983; accepted 12 Jan 1984.)

STORAGE OF *Sisyrinchium* (IRIDACEAE) POLLEN.—An important aspect of biosystematic research is interspecific hybridization. In my study of *Sisyrinchium* sect. *Bermudiana* (Iridaceae), plants were grown under nearly identical conditions but it was impossible to promote simultaneous flowering. It was necessary, then, to store pollen until stigmas became receptive. Deep-freezing has been used successfully for long-term storage of crop pollen (Nath and Anderson, Cryobiology 12:81–83. 1975; Barnabas and Rajke, Ann. Bot. 48:861–864. 1981) and studies in the Orchidaceae and a few other taxa (Meeyot and Kamemoto, Amer. Orchid Soc. Bull. 38:388–393. 1969; Löve and Löve, Plant Chromosomes. 1975) have shown that binucleate pollen can remain viable for several months if stored at 0–8°C with a desiccant. Although *Sisyrinchium* and other members of Iridaceae have binucleate pollen (Brewbaker, Amer. J. Bot. 54:1069–1083. 1967), such viability data were unavailable for this genus.

My objective in this study was to ascertain the length of time *Sisyrinchium* pollen (binucleate) would remain viable, when stored at 5°C.

Dehiscing anthers were dissected from numerous flowers of *Sisyrinchium montanum* E. L. Greene, placed in screw-capped glass vials, and stored at 5°C. Pollen from anthers stored for 2, 10, 15, 30, and 60 days, and from newly dehiscent anthers of *S. montanum,* were placed on sterile media consisting of 2% agar and 15% sucrose (Rodionenko and Burova, Bot. Zhurn. [Moscow and Leningrad] 55:300–302. 1970) and incubated at 25°C for 24 h. The samples were then examined with a light microscope and the number of pollen tubes was recorded. Three trials were made from each storage treatment, and the fresh pollen was used as a control for all treatments.